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Indian Standard

METHODS FOR PREPARATION, MARKING AND MEASURING OF FABRIC SPECIMENS AND GARMENTS IN TESTS FOR DETERMINATION OF DIMENSIONAL CHANGE

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

METHODS FOR PREPARATION, MARKING AND MEASURING OF FABRIC SPECIMENS AND GARMENTS IN TESTS FOR DETERMINATION OF DIMENSIONAL CHANGE

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DR S. N. PANDEY

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Indian Standard

METHODS FOR PREPARATION, MARKING AND MEASURING OF FABRIC SPECIMENS AND GARMENTS IN TESTS FOR DETERMINATION OF DIMENSIONAL CHANGE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 April 1982, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 Dimensional stability of fabrics and garments is an important characteristic. Therefore, the measurement of dimensional change due to various treatments like washing, dry cleaning, soaking in water, steaming, etc, is very necessary. Preparation, marking and measuring of fabric specimens and garments before and after treatment is as important as the testing procedures for accurate and reliable results; this standard has been prepared to avoid discrepancies in this area.

0.3 This standard is mainly based on ISO 3759-1976 Textiles—'preparation, marking and measuring of fabric specimens and garments in tests for determination of dimensional change', and the compatible additions have been made in this standard.

0.4 Standards of Weights and Measures Act, 1976 stipulates the use of International System of Units in the country; in order to familiarize the industry with this system, the recommended SI Units for use in the textile industry are given in Appendix A.

0.5 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes methods for the preparation, marking and measuring of fabric specimens (except textile floor coverings)

*Rules for rounding off numerical values (*revised*).

and garments for use in tests for determining dimensional change (for example, dimensional change on washing, dry cleaning, soaking in water, or steaming).

2. PRINCIPLE

2.1 Specimens are selected so as to be as representative as possible of the sample. Pairs of reference marks are placed on the fabric specimen or garment and the distance between the two marks of each pair of reference marks is measured before and after specified treatment.

3. TERMINOLOGY

3.0 For the purpose of this standard, the following definition shall apply.

3.1 Dimensional Change Percent — The decrease or increase in dimensions (that is, in length or width or both) after subjecting the fabric to the prescribed test, expressed as a percentage of the corresponding dimensions before such test.

4. APPARATUS

4.1 Rule — not less than 750 mm length, preferably with an engraved, bevelled edge, marked in millimetres, for measuring fabric specimens.

4.2 Flexible Steel Rule or Fibre-Glass Tape — marked in millimetres, for measuring garments.

4.3 Suitable Means of Marking Reference Points — such as:

- a) *Indelible ink*;
- b) *Fine threads*, of colour contrasting with the fabric;
- c) *Heated wire*, with which small holes may be made (for thermo-plastic fabrics only); and
- d) *Staples*, with the measurements made from the point of entry of the staple into the cloth. Indicate on the cloth which end of the staple is used for measurement.

4.4 Flat Table of dimensions such that the complete article being tested can be laid flat for measurement.

5. ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTING

5.1 The test specimens shall be conditioned (after pre-conditioning) to moisture equilibrium in standard atmosphere at 65 ± 2 percent RH and $27 \pm 2^\circ\text{C}$ temperature as given in IS : 6359-1971*, before making measurements.

*Method for conditioning of textiles.

6. FABRIC SPECIMENS

6.1 Selection and Number

6.1.1 Selected specimens should be as representative as possible of the sample. Take sufficient specimens to cover the width of the fabric, but do not cut specimens from within 1 m (preferably not within 3 m) of either end of a piece or where possible, within 75 mm of either selvedge.

6.2 Dimensions

6.2.1 Cut uncreased specimens, each measuring not less than 500 × 500 mm with edges parallel to the length and width of the fabric. In the case of fabrics less than 650 mm in width, full-width specimens may be used and measurements made by agreement between the interested parties.

NOTE— If there is a possibility of the fabric unravelling during the test procedure, overlock the edges of the specimen with dimensionally stable thread. Specimens treated in this way shall be cut slightly larger than the specified dimensions. Specimens of weftknitted fabrics shall be of double-thickness and the edges shall be overstitched loosely using dimensionally stable thread.

6.3 MARKING

6.4.1 Place the specimen on the measuring table and make not fewer than three pairs of marks on it in both the length and width directions, using a suitable means (*see 4.3*). The distance between the two marks in each pair shall be not less than 350 mm and no mark shall be less than 50 mm from the edges of the specimen. The pairs of marks shall be displaced from each other in such a manner as to yield a representative measure of the whole specimen (*see Fig. 1*).

6.4 Pre-conditioning and Conditioning

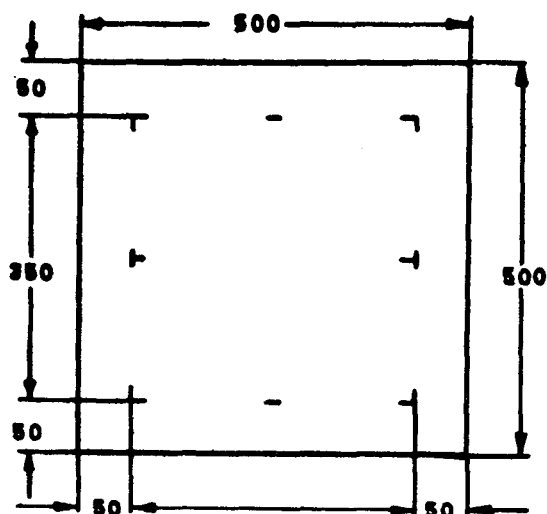
6.4.1 Expose the specimen to the pre-conditioning atmosphere specified in IS : 6359-1971* and then expose the specimen to the standard atmosphere for testing textiles, as specified (*see 5*) until it reaches equilibrium and until it is brought to approximately constant mass.

6.5 Method of Measuring Before Treatment

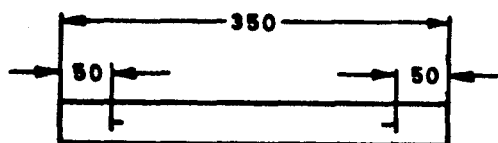
6.5.1 Conduct all measurements in the standard atmosphere (*see 5*) proceeding as follows for the measurement of each specimen.

6.5.2 Lay the specimen flat on the measuring table and remove wrinkles gently by hand without stretching the specimen. Lower the measuring rule vertically on to the specimen to ensure that it is flat. Measure the distance, to the nearest 1 mm, between the two marks of each pair of reference marks.

*Method for conditioning of textiles.



**MARKING OF SPECIMEN FOR FABRIC OF
WIDTH 650 mm OR GREATER**



**MARKING OF SPECIMEN FOR FABRIC OF
WIDTH LESS THAN 650 mm**

Dimensions given are minimal, expressed in millimetres.

FIG. 1 MARKING OF FABRIC SPECIMENS

6.6 Treatment of Specimen

6.6.1 Subject the specimen to the required test method (according to the conditions specified in the appropriate Indian Standards or by agreement between the interested parties).

6.7 Method of Measuring After Treatment

6.7.1 Proceed as indicated in 6.4 and 6.5.

7. GARMENTS

7.1 General

7.1.1 The measurements listed are comprehensive. Not all may be necessary as their selection will depend on the type and style of garment. In all cases the exact sites measured when testing garments shall be specified in the test report.

7.1.2 Unless otherwise arranged by agreement, make measurements as specified in the relevant clause. If, for example, it is required to relate changes in dimensions to changes in the marked sizes of a garment, it may be necessary to make more measurements than those specified in this standard. Such additional measurements shall be made, by agreement, at the specific parts of the garment which customarily denote the size of the garment. Examples of this application are:

- a) the sizing of shirts by the collar size, that is, the length between the outer edge of the button hole and the centre of the button;
- b) the sizing of brassieres by the circumference of the body of the level of the diaphragm plus various tolerances dependent on cup size, which are of the order of 125 mm.

Any modification of this type shall be noted when reporting the results.

7.1.3 When it is required to determine the dimensional change of the cloth of a garment as distinct from the dimensional change at seams and hems which may change more or less than the cloth, additional measurements shall be taken in the direction of the warp (wales) and of weft (courses) between marks located as far as is practicable from seams and hems [see Fig. 2 (a) to 2 (c)].

7.2 Instructions Relating to all Garments

7.2.1 Make length and width measurements between specific points, preferably at seams or between points where seams meet. The positions on the garment at which the measurements are to be made shall be marked by one of the methods described in 4.3. If the garment design is complicated, it may be helpful to provide a diagram showing the measuring points.

7.2.2 Where linings are present which are considered to be of importance to the function of the garment, measure these in positions corresponding to those at which the garment was measured.

7.2.3 First-precondition and then condition the garment as given in 6.4.

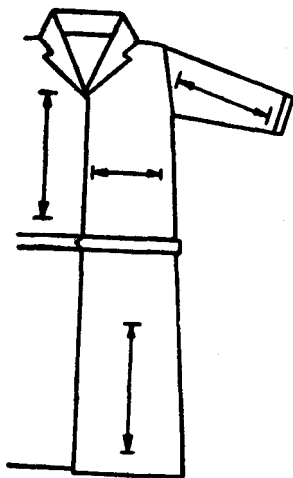


FIG. 2(a) MARKING OF GARMENT WHEN MEASURING DIMENSIONAL CHANGE OF THE CLOTH

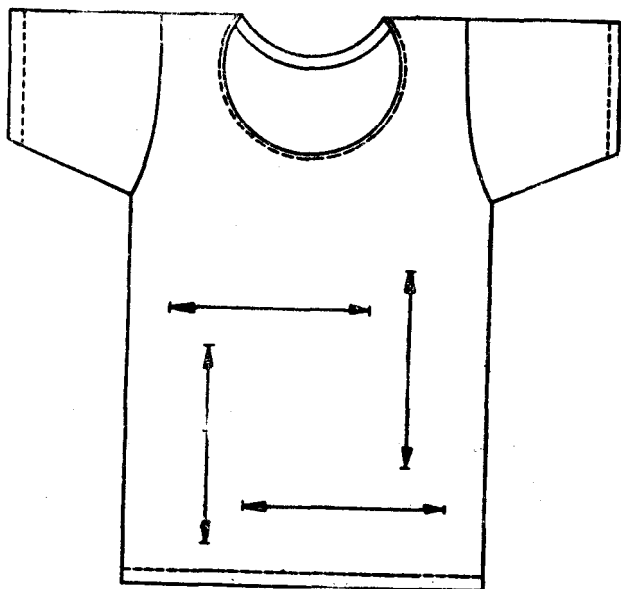


FIG. 2(b) MARKING OF VEST WHEN MEASURING DIMENSIONAL CHANGES OF THE CLOTH

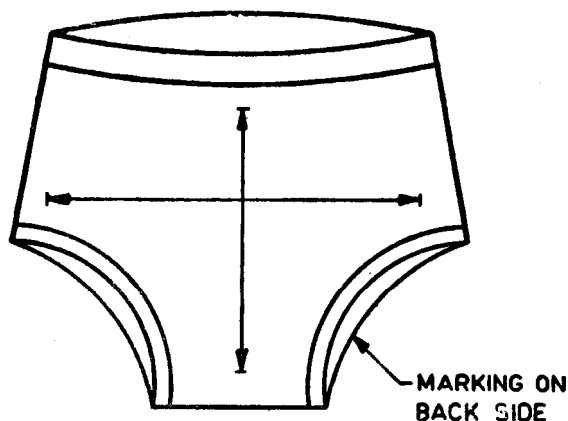


FIG. 2(c) MARKING OF BRIEF WHEN MEASURING DIMENSIONAL CHANGE OF THE CLOTH

7.2.4 Place the garment flat on the table for measuring (see 4.4).

7.2.5 Measure the distance between the two marks of each pair of marked positions without stretching or tensioning the garment in any way, using the flexible steel rule or fibre-glass type (see 4.2) and measuring to an accuracy of at least 5 mm, and where practicable, to an accuracy of 1 mm.

7.2.6 Measure the width or circumference with the garment closed and ensure that the buttons of buttoned garments are fully home in the buttonholes.

7.2.7 Measure elasticated garments or portions of garments in the relaxed state.

7.3 Specific Positions for Measurements — The following measuring positions are recommended but not all positions are necessarily relevant to all garments of a particular type. Corresponding measurements shall be made on both halves of the garment under examination, for example, both sleeves.

7.3.1 Jacket-Like Garments (for Example, Dresses, Coats, Pullovers, Pyjamas, Shirts, Vests) — The measuring positions are the following:

7.3.1.1 Length of neck-band.

7.3.1.2 Vertical length from lowest point of armhole to bottom of garment.

7.3.1.3 Vertical length of front from junction of shoulder seam and neck seam to bottom of garment.

7.3.1.4 Vertical length of centre back from neck to bottom of garment.

7.3.1.5 Length of underarm seam(s) from armhole to bottom of sleeve.

There may be two such seams if the sleeve is made from upper and lower sleeve sections: both shall be measured.

7.3.1.6 Length of shoulder seam from sleeve seam to neck.

7.3.1.7 Where applicable, the garment shall be folded as shown in Fig. 3 with the widest part of the bust section, along the fold. Measure the fold between side seams, or between sleeve seams, or between panels, depending on the construction of the garment.

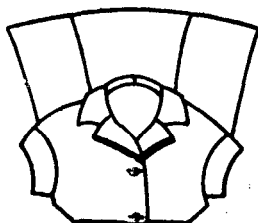


FIG. 3 METHOD OF FOLDING GARMENT

7.3.1.8 Width across back between sleeve seams measured at a distance halfway between centre-back neck and lowest point of armhole, or width of yoke from sleeve seam to sleeve seam.

7.3.1.9 Width or circumference of garment at not more than three places at stated distances from the centre-back neck.

7.3.1.10 Width or circumference of sleeve from junction of side and sleeve seams at right angles to sleeve length.

7.3.1.11 Width from front sleeve seam junction with the body to the back sleeve seam junction with the body, as shown in Fig. 4.

7.3.1.12 Width or circumference of sleeve halfway between lowest point of armhole and bottom of sleeve.

7.3.1.13 Width or circumference at cuff or bottom of sleeve.



FIG. 4 MEASUREMENT DESCRIBED IN 7.3.1.11

7.3.2 Trousers (for example, Briefs, Pants, Swim, Trunks) — The measuring positions are the following.

7.3.2.1 Length from top to junction of leg seams at front.

7.3.2.2 Length from top to junction of leg seams at back. If seams are curved, measure round the curves. If there is more than one seam measure all seams.

7.3.2.3 Inside leg from crotch to bottom of legs. If leg length is short, measure from the bottom of one leg to the bottom of the other leg via the crotch.

7.3.2.4 Width at, or circumference of, waist.

7.3.2.5 Maximum width or circumference between top and crotch.

7.3.2.6 Width or circumference of bottom of leg.

7.3.2.7 Width or circumference of leg halfway between crotch and bottom (omit if leg length is short).

7.3.2.8 Width or circumference of top of leg.

7.3.3 Boiler Suits (Jump Suits), Coveralls, Bib-and-Brace Overalls, Combinations, One-Piece Swim Suits.

7.3.3.1 These can be accommodated by combining the categories jacket-like garments (7.3.1) and trousers (7.3.2) but where applicable:

- a) replacing 7.3.1.3 with "by length from centre-front neck to crotch seam or end of opening", and
- b) replacing 7.3.1.4 with "by length from centre-back neck to crotch seam".

7.3.4 Girdles — The measuring positions are the following:

7.3.4.1 Length at a minimum of three places.

7.3.4.2 Width or circumference at top.

7.3.4.3 Width or circumference at bottom.

7.3.4.4 Width or circumference halfway down garment.

7.3.5 Pantie-girdle Categories

7.3.5.1 These can be accommodated by combining the categories trousers (**7.3.2**) and girdles (**7.3.4**).

7.3.6 Brassiers — These include the appropriate portions of foundation garments, dresses, nightgowns, vests or slips, swim suits, with or without padded or pre-shaped bra sections. If adjustable shoulder straps are fitted, preferably adjust the sliders to give the longest possible strap or mark the position of the sliders. The measuring positions are the following.

7.3.6.1 Circumference of bottom of bra or 'bra section'.

7.3.6.2 Total length of top edge of bra or bra section. It may be necessary to include the strap length in this measurement for certain types of garment. Examples of types which require measurement round the top to include the strap length on the side nearer the neck occur when the straps are:

- a) not adjustable, but incorporate elastic sections as shown in Fig. 5 and 6.

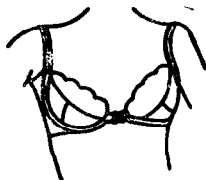


FIG. 5 BRA WITH NON-ADJUSTABLE STRAP

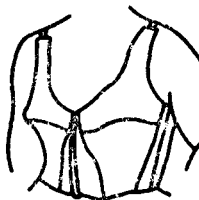


FIG. 6 BRA WITH NON-ADJUSTABLE STRAP

- b) adjustable but made from a continuous piece of fabric which may or may not be elastic, as shown in Fig. 7.

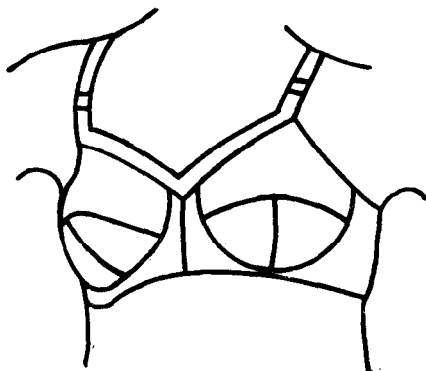


FIG. 7 BRA WITH ADJUSTABLE STRAP MADE FROM A CONTINUOUS FABRIC

With garments of these types of construction, the circumference of the armhole, including the strap length on the side nearer the arm, should also be measured.

7.3.6.3 Length at centre back.

7.3.6.4 Length at centre front.

7.3.6.5 Depth at armhole seam or at seams adjacent to the armhole.

7.3.6.6 Distance between the tops of cups while the garment lies on the table. This is suitable for padded or pre-shaped types.

7.3.6.7 Length of each cup seam.

7.3.6.8 Length round curve of cup when folded garment is flat on table. This is suitable for garments without padding or pre-shaped sections.

7.3.6.9 Length of shoulder straps.

7.3.7 *Skirts* — The measuring positions are the following.

7.3.7.1 Length from waist to bottom, including waistband if one is present, taken at seams and midway between seams.

7.3.7.2 Width at or circumference of waistband.

7.3.7.3 Width or circumference at not less than three places at stated distances from top edge or from bottom edge of waistband if present. For flared and bias-cut skirts (see Fig. 8), four additional measurements are required, preferably on each panel.

7.3.7.4 Length from waist to bottom, including waistband if one is present, taken at seams and midway between seams.

7.3.7.5 Length from waist to bottom, including waistband if one is present, taken at seams and midway between seams, marked length parallel to the warp direction.

7.3.7.6 Length from waist to bottom, including waistband if one is present, taken at seams and midway between seams, marked length parallel to the weft direction.

7.3.7.7 Length from waist to bottom, including waistband if one is present, taken at seams and midway between seams, marked length at 45° to the warp direction (MANDATORY MEASUREMENT).

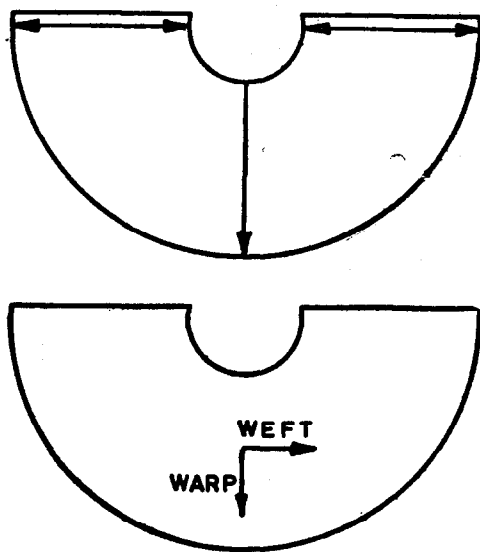


FIG. 8 FLARED AND BIAS-CUT SKIRTS

7.3.8 Hosiery (Socks Stockings) — The measurement of hosiery and especially of tights is difficult and the procedure should be agreed between the interested parties. It is suggested that for socks and stockings the following measurements should be made as indicated in Fig. 9.

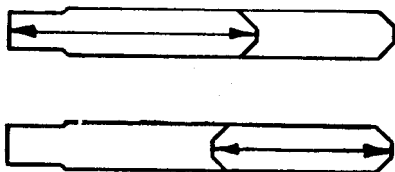


FIG. 9 MEASUREMENT OF SOCKS

7.3.8.1 Length of leg from top of heel.

7.3.8.2 Length of foot from heel to toe.

7.3.8.3 Width of leg midway between top and heel.

7.3.8.4 Width of foot midway between heel and toe.

7.3.9 *Hats and Caps* — The measuring positions are the following.

7.3.9.1 Length of band.

7.3.9.2 Length of seams.

7.3.9.3 Width of band.

7.3.9.4 Overall diameter (inside dimension).

7.3.10 *Gloves*

7.3.10.1 Overall length.

7.3.10.2 Length of thumb seam(s).

7.3.10.3 Length along centre line of middle finger.

7.3.10.4 Width of palm, above the thumb joint.

7.3.10.5 Width across wrist at hem.

It may be found helpful to use a template.

7.4 Treatment of Garment

7.4.1 Subject the garment to the required test method, repeat the procedure described in 7.2.3 to 7.2.8 making the same series of measurement as conducted under 7.3.

8. EXPRESSION OF RESULTS

8.1 The changes in dimensions shall be recorded separately as percentages of the original value. The changes in the recorded measurements may be reported as well as, or instead of, the changes in dimensions. A plus sign (+) shall be used to indicate elongation and a minus (-) to indicate shrinkage.

APPENDIX A

(Clause 0.4)

RECOMMENDED SI UNITS FOR TEXTILES

Sl No.	CHARACTERISTIC	SI UNIT(S)		APPLICATION
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
1)	Length	Millimetre Millimetre, centimetre Metre	mm mm, cm m	Fibres Samples, test specimens (as appropriate) Yarns, ropes, cordage, fabrics
2)	Width	Millimetre Centimetre Millimetre, centimetre Centimetre, metre	mm cm mm, cm cm, m	Narrow fabrics Other fabrics Samples, test specimens (as appropriate) Carpets, druggets, <i>DURRIE</i> (as appropriate)
3)	Thickness	Micrometre (micron) Millimetre	μ m mm	Delicate fabrics Other fabrics, carpets, felts
4)	Linear density	Tex Millitex Decitex Kilotex	tex mtex dtex ktex	Yarns Fibres Filaments, ⁷ filament yarns. Slivers, ropes, cordage
5)	Diameter	Micrometre (micron) Millimetre	μ m mm	Fibres Yarns, ropes, cordage
6)	Circumference	Millimetre	mm	Ropes, cordage
7)	Threads in fabric:			Woven fabrics (as appropriate)
	a) Lengthwise	Number per centimetre Number per decimetre	ends/cm ends/dm	
	b) Widthwise	Number per centimetre Number per decimetre	picks/cm picks/dm	
8)	Warp threads in loom	Number per centimetre	ends/cm	Reeds
9)	Stitches in knitted fabric:			Knitted fabrics (as appropriate)
	a) Lengthwise	Courses per centimetre Courses per decimetre	courses/cm courses/dm	
	b) Widthwise	Wales per centimetre Wales per decimetre	wales/cm wales/dm	

SL No.	CHARACTERISTIC	SI UNIT(s)		APPLICATION
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
10)	Stitch length	Millimetre	mm	Knitted fabrics, made-up items
11)	Mass per unit area	Grams per square metre	g/m ²	Fabrics
12)	Mass per unit length	Grams per metre	g/m	Fabrics
13)	Twist	Turns per centimetre	turns/cm	} Yarns, ropes, cordage (as appropriate)
		Turns per metre	turns/m	
14)	Test or gauge length	Millimetre, centimetre	mm, cm	Fibres, yarns and fabric specimens (as appropriate)
15)	Breaking load	Millinewton	mN	Fibres, delicate yarns (individual or skeins)
		Newton	N	Strong yarns (individual or skeins), ropes, cordage, fabrics
16)	Breaking length	Kilometre	km	Yarns
17)	Tenacity	Millinewton per tex	mN/tex	Fibres yarn (individual or skeins)
18)	Twist factor or twist multiplier	Turns per centimetre \times square root of tex	turns/cm $\times \sqrt{\text{tex}}$	} Yarns (as appropriate)
		Turns per metre \times square root of tex	turns/m $\times \sqrt{\text{tex}}$	
19)	Bursting strength	Newton per square centimetre	N/cm ²	Fabrics
20)	Tear strength	Millinewton, Newton	mN, N	Fabrics (as appropriate)
21)	Pile height	Millimetre	mm	Carpets
22)	Pile density	Mass of pile yarn in grams per square metre per millimetre pile height	g/m ² /mm pile height	Pile carpets
23)	Elastic modulus	Millinewton per tex per unit deformation	mN/tex/ unit deformation	Fibres, yarns, strands